



A new species of Anthiadinae (Teleostei: Serranidae) from São Pedro and São Paulo Archipelago, Brazil, Equatorial Atlantic.

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Abstract

A new species of Anthiadinae, *Odontanthias cauoh*, is described from São Pedro and São Paulo Archipelago (SPSPA), Brazil, Equatorial Atlantic. The new species differs from its only Atlantic congener by a combination of several characters: pectoral-fin rays 20; total gill rakers on first arch 39; vomerine tooth patch with a posterior prolongation; pelvic fin not reaching base of last anal-fin ray; dorsal, anal and pelvic fins scaleless; and coloration (dorsal, anal, and pelvic fins mostly dark red). The record of the new species contributes to increase the fish endemism in SPSPA.

Key words: *Odontanthias cauoh*, taxonomy, oceanic islands, endemism

Introduction

The family Serranidae, as defined by Johnson (1983) and van der Laan *et al.* (2014, 2016), comprises three subfamilies: Epinephelinae, Serraninae and Anthiadinae. The last subfamily contains at least 29 genera with more than 215 species (Anderson & Heemstra, 2012; Heemstra *et al.*, 2003; Nelson *et al.*, 2016). According to Anderson & Heemstra (2012), *Odontanthias* comprises 14 Indo-Pacific species and one Atlantic species, *Odontanthias hensleyi* Anderson & Garcia-Moliner, 2012.

Intensive studies of the fish fauna of the Brazilian oceanic islands are relatively recent (Gasparini & Floeter, 2001; Feitoza *et al.*, 2003; Pinheiro *et al.*, 2009, 2011; Pereira-Filho *et al.*, 2011). Prior to 2008, many different types of fishes were recorded in the São Pedro and São Paulo Archipelago (SPSPA), also known as St. Paul's Rocks, Brazil, of which 100 were identified to species level, eight to genus, and eight to family (Vaske Jr. *et al.*, 2005). New records have been reported recently from the archipelago (Vaske Jr. *et al.*, 2008; Lima-Filho *et al.*, 2011; Bezerra *et al.*, 2011; Viana *et al.*, 2012), and a few more have yet to be reported for the first time (Macena, B.C.L., unpub. data) and described (Nunes *et al.*, 2016). The SPSPA is included in the Brazilian Pró-Arquipélago Program (Brazilian National Science and Technology Council- CNPq and Secretariat of the Inter-Ministerial Commission for the Resources of the Sea/ Navy of Brazil Consortium), and research activities have been developed almost throughout the year, since 1998, helping the researchers to increase the overall knowledge in the region (review in Viana *et al.*, 2009).

The SPSPA (0°55'N; 29°21'W, Fig. 1) is an important scientific ground for biodiversity and biogeographic studies because it is situated in the path of the South Equatorial Atlantic current that flows westward, and the Equatorial undercurrent that flows eastward. These currents may influence species distribution in the archipelago, especially at depths beyond 150 m, which are underexplored and may harbor a large number of unknown species.

Until recently the only serranid species known to occur in the SPSPA were *Cephalopholis fulva* Linnaeus, 1758, *Epinephelus itajara* Lichtenstein, 1822, *Rypticus saponaceus* Bloch & Schneider, 1801 (Vaske Jr. *et al.*, 2005), and *Choranthias salmopunctatus* (Lubbock & Edwards, 1981), the latter a small endemic anthiadine from the Archipelago. In the present study, another Serranidae, *Odontanthias cauoh* sp. n., is described.

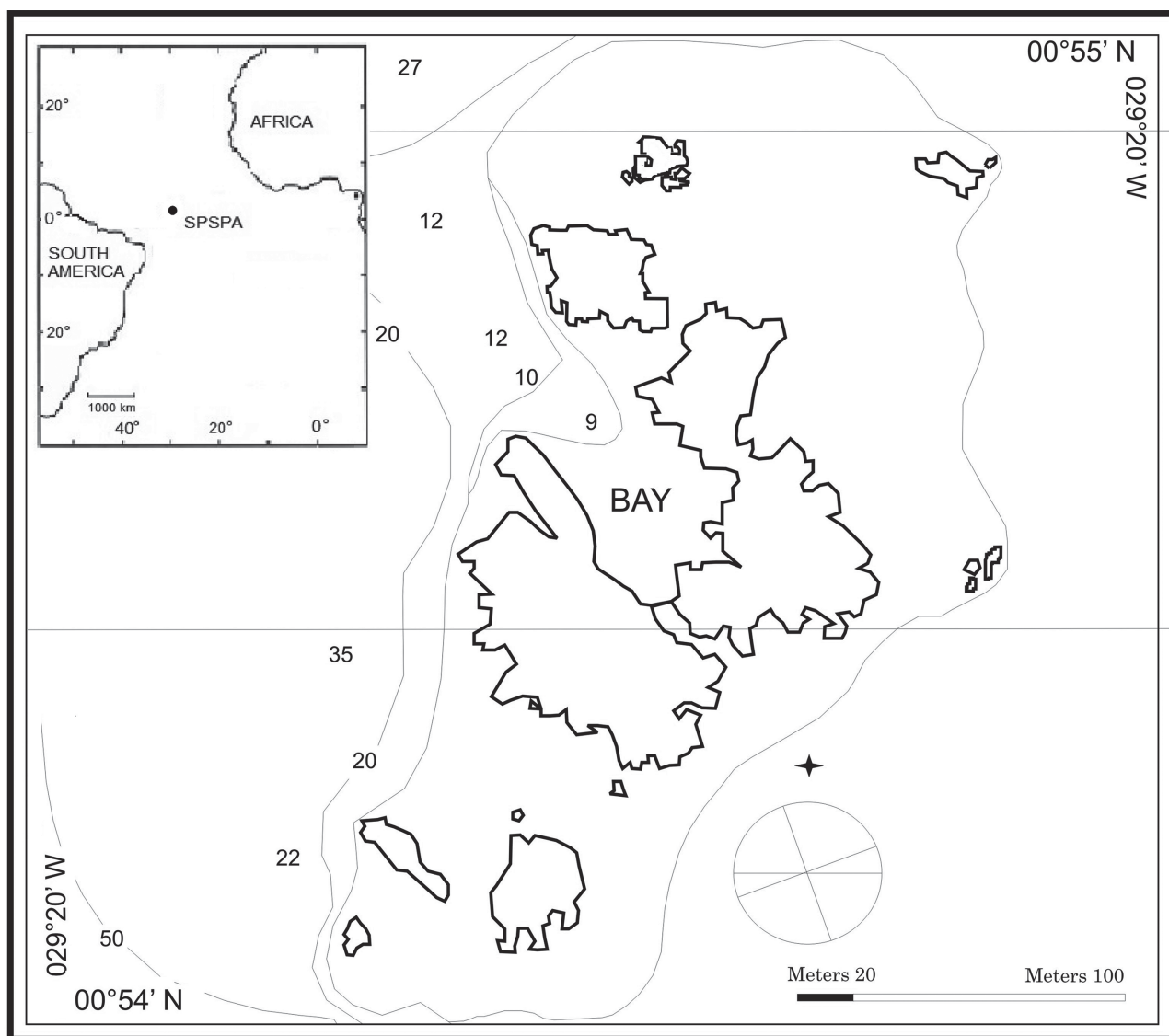


FIGURE 1. Location and configuration of São Pedro and São Paulo Archipelago (SPSPA), Brazil (Viana *et al.*, 2012).

Material and methods

The only known specimen was collected with dip-net by professional fishermen in 2012, floating at the surface, apparently dying of unknown causes. It has bite marks on the caudal peduncle, probably inflicted by the black triggerfish *Melichthys niger* (Bloch 1786), which is abundant around the archipelago; most of the upper caudal-fin lobe is missing. Measurements follow Anderson and Heemstra (1980) as modified by Anderson *et al.* (1990) and Anderson & Baldwin (2000) and were obtained with a manual caliper with a precision of 0.05 mm or a millimeter ruler within 1.0 mm. Institutional abbreviations follow Sabaj-Pérez (2014). The type is preserved and deposited in MZUSP collection.

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(Fig. 2 & 3; Table 1)

Type material. Holotype. MZUSP 111260, female, 165.2 mm standard length (SL). São Pedro and São Paulo Archipelago, Brazil (0°55'N; 29°21'W), collected by B.C.L. Macena, floating at the surface close to the rocks in January 23, 2012.



FIGURE 2. *Odontanthias cauoh* sp. n., MZUSP 111260, holotype, 165.2 mm SL from São Pedro and São Paulo Archipelago, Brazil. Photo by authors.

Diagnosis. The new species differs from its only Atlantic congener by a combination of several characters: pectoral-fin rays 20; total gill rakers on first arch 39; vomerine tooth patch with a posterior prolongation; pelvic fin not reaching base of last anal-fin ray; dorsal, anal, and pelvic fins scaleless; and coloration (dorsal, anal, and pelvic fins mostly dark red).

Description. Morphometric data is presented in Table 3. Dorsal-fin rays X, 15; anal-fin rays, III, 7; all dorsal- and anal-fin rays branched; pectoral-fin rays 20, all but uppermost branched; pelvic-fin rays I, 5, all soft rays branched; caudal-fin rays: principal 15, procurent 6 dorsally and 6 ventrally, posteriormost 3 of both sides segmented; branchiostegal rays 7. Gill rakers on first arch 13 + 26, total 39. Tubed lateral line scales 38. Rows of scales on cheek 9; rows of scales between origin of anal fin and lateral line 12, between lateral line and mid-base of spinous dorsal fin 1.5, between origin of dorsal fin and lateral line 5. Circumpeduncular scales 18. Supraneural bones two; precaudal vertebrae 10, caudal vertebrae 16, total 26.

Body oblong, laterally compressed. Head large, more than one third of the SL. Orbit diameter larger than snout length, 8.4% of SL and 24.7% of head length. Upper profile of interorbital straight to slightly convex. Nostrils close together, internarial distance contained 8.7 times in snout length. Posterior nostril large, oval shaped; anterior nostril in a tube much wider at base than at distal tip.

Upper limb of preopercle smooth on upper one third, becoming finely serrate towards angle, serrae becoming coarser on lower portion of limb; lower limb smooth with two small posteriorly directed spines located at about last posterodorsal one-fifth of limb length; distal margins of interopercle and subopercle with few small serrae near their junction. Mouth oblique, lower jaw projecting beyond upper when mouth closed; upper jaw reaches beyond a vertical line through middle of eye, almost to posterior border of pupil; maxilla broadly expanded posteriorly, upper posterior angle straight, not rounded; maxillary hook absent.

Premaxilla with inner band of small villiform teeth and outer series of larger conical teeth; a few teeth of inner band near symphysis enlarged as posteriorly directed conical teeth; two teeth in outer series near symphysis enlarged, canine-like; symphysis toothless. Dentary with series of conical teeth, one enlarged into recurved canine at the first one-third on each side; anterior to recurved canine, band of villiform to small conical teeth extending to

near symphysis where one canine-like tooth is enlarged, posteriorly directed and present only on jaw's left side; symphysis toothless. Vomerine tooth patch grossly pentagonal, with a posterior prolongation of small teeth arranged in four pairs, which are followed by a series of six single teeth (Fig. 3); vomerine and palatine teeth villiform to small conical, those following the posterior part of vomerine patch somewhat enlarged and conical; palatine teeth in a band, narrowest posteriorly. Mesopterygoids with many villiform teeth. Tongue with a patch of minute teeth on upper bony blade, none at borders, tip, or ventral side. Gill rakers long, but those at center of lower first arch only somewhat longer than opposite gill filaments.

Dorsal-fin membrane without filament at distal end of each dorsal spine, seventh and ninth dorsal spines longest; soft dorsal fin only slightly elevated relative to spinous dorsal fin; posterior end of dorsal fin not produced, almost rounded. Anal-fin origin below first dorsal-fin soft ray; second anal-fin spine stronger than first or third, shorter than third; third anal-fin soft rays longest; fin posteriorly truncate.

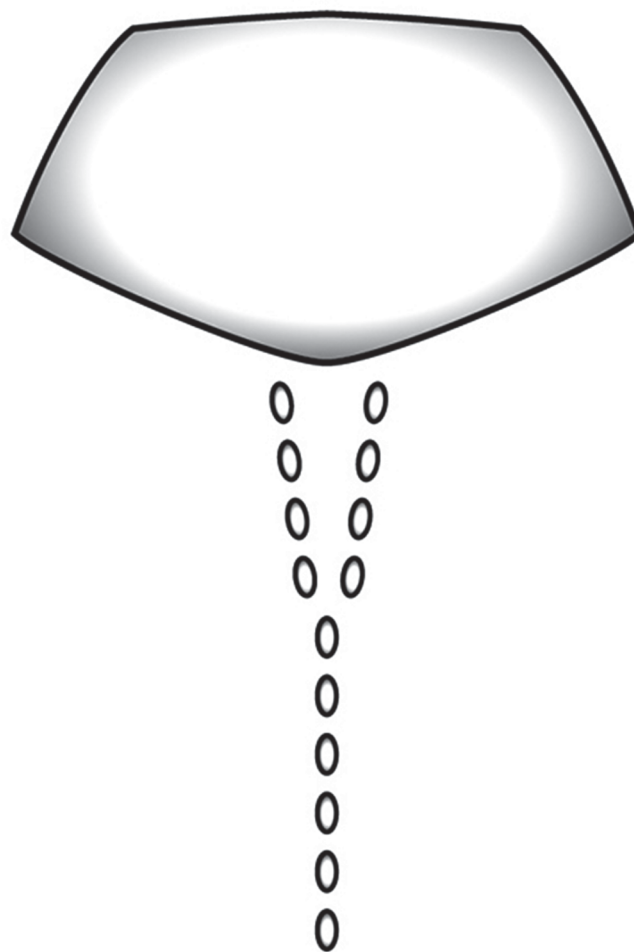


FIGURE 3. *Odontanthias cauh* sp. n., shape of vomerine tooth patch and posterior teeth. Illustration by Marcel Hein & Renato Miranda.

Pelvic fin extending posteriorly to sixth anal-fin soft ray; first three soft pelvic-fin rays (second longest) produced. Pectoral fin rounded, central rays longest, reaching a vertical to base of second anal-fin spine; upper pectoral-fin ray unbranched; pectoral-fin rays heavily scaled proximally except for uppermost and lowermost three rays; other rays with columns of two to more than 20 scales, length of scale columns increasing towards center of fin, central ray with column that covers about 20% of its length. Caudal fin partially damaged, upper lobe mostly missing, lower lobe produced and anterior one-third heavily scaled.

Scales large, ctenoid, cteni only marginal. Lateral line follows dorsal profile to last dorsal soft ray, straight to caudal-fin base. Snout mostly scaly, naked on its lateral aspect. Maxilla scaled; posterior two-thirds of lower jaw scaly, anterior third naked; gular region naked. Dorsal and anal fins entirely scaleless, with no scales on membranes, spines, rays or at their bases. A few accessory scales present only on head.

TABLE 1. Selected morphometric data of Atlantic *Odontanthias*, in % of standard length (SL). Data for *O. hensleyi* are for type material based in Anderson & García-Moliner (2012).

Character	<i>O. cauah sp. n.</i>	<i>O. hensleyi</i>
Number of specimens	Holotype	4
Standard length (mm)	167.5	155–162
Head length	34.0	34.8–36.4
Snout length	7.2	6.6–7.6
Orbit diameter	8.4	11.0–11.8
Postorbital length	17.3	15.5–17.3
Upper jaw length	15.6	17.7–19.1
Maxilla width	3.8	6.2–7.3
Lower jaw length	13.7	18.2–20.8
Interorbital width	8.0	8.2–9.3
Body depth	36.5	39.0–42.2
Body width	13.6	16.1–18.4
Predorsal-fin length	32.8	34.0–34.9
Preanal-fin length	64.2	63.6–67.2
Prepelvic-fin length	35.8	36.7–37.7
Caudal peduncle length	17.9	23.0–25.5
Caudal peduncle depth	11.0	12.5–13.8
Dorsal fin base length	59.4	56.1–60.1
Anal fin base length	17.3	16.3–18.5
Pectoral fin length	27.5	35.3–43.8
Pelvic fin length	43.2	Ca. 60.7–79.9
Pelvic spine length	14.6	17.0–18.2
Anal fin length, depressed	28.4	33.7–37.7
Upper caudal lobe	Damaged	>73.4–85.8
Lower caudal lobe	37.7	>65.8–84.5
First dorsal spine length	6.0	5.3–6.8
Second dorsal spine length	9.1	8.0–9.7
Third dorsal spine length	10.4	10.1–11.5
Fourth dorsal spine length	10.7	10.9–13.6
Longest dorsal spine ¹	11.8	10.9–14.0
First dorsal soft ray	13.3	14.7–16.5
Last dorsal soft ray	9.6	>12.3–14.2
Longest dorsal soft ray ²	16.4	25.0–28.6
First anal spine length	5.3	5.4–7.1
Second anal spine length	9.3	10.8–13.0
Third anal spine length	11.1	11.5–14.4
Longest anal soft ray ³	17.6	21.3–25.9

¹7th and 9th in *O. cauah* and 4th, 5th, 9th or 10th in *O. hensleyi*.

²13th in *O. cauah* and 9th or 10th in *O. hensleyi*.

³3rd in *O. cauah* and 4th in *O. hensleyi*.

Color of live specimen. Head and body red with orange hue overall, lighter, pinkish on belly, throat, maxilla and lower jaw; scales on sides of the body mostly with lighter center. Iris red, an inner bright yellow circle surrounding the dark pupil. Head with three horizontal yellow stripes, broken posteriorly: lower stripe beginning almost at proximal tip of premaxilla, running under ventral border of eye to origin of pectoral fin; central stripe originating at posterior margin of eye, extending to posteriormost point of opercular margin; dorsalmost stripe split into several blotches, extending from upper border of eye to upper border of opercle. Pectoral fin uniformly orange-red, blending in with ground color of body. Dorsal fin red with fin-membrane suffused with white from first to fifth spines; pelvic fin orange-red, suffused with white on membrane between fourth and fifth rays and on anterior border of spine; anal fin mostly red with some orange hues. Lower lobe of caudal fin orange-red suffused with yellow hues.

Color of preserved specimen. Coloration completely faded to uniformly pale pinkish beige after short time in 70% ethanol. Yellow lines on head slightly visible, paler than body background color.

Distribution. *Odontanthias cauoh* sp. n. is currently known only from São Pedro and São Paulo Archipelago, Brazil, Western Central Atlantic (Fig. 1). No data about its depth range is available.

Etymology. The new species is named after the popular name given by the professional fishermen to the fish at St. Paul's Rocks, "Carolina", shortened to the nickname (Cauó) of the first author's elder daughter, Ana Carolina S.R. Carvalho, pronounced as "kau-oh". Proposed English name: Red Jewelfish due to the color of the known specimen. Proposed Portuguese (Brazilian) name: Carolina.

Biological aspects. The stomach of the holotype was examined and found to be empty, with no trace of biological material. The gonads were analyzed macroscopically, indicating an immature female specimen.

Discussion

Odontanthias is represented in the Indo-Pacific by 14 species and in the Atlantic by one (Anderson & Heemstra, 2012). The genus is distinguished from *Holanthias* on the basis of the shape of the caudal fin ("deeply emarginate with rounded lobes to lunate with slender, sometimes filamentous lobes" in *Odontanthias* vs. "near-truncate to rounded or rhomboid...with a long slender lobe in the ventral part of the fin of one of the species" in *Holanthias*) and the absence of accessory scales on the body scales of species of *Odontanthias* (although present "on the head and nape of a few species") vs. "numerous accessory scales on the body scales of *Holanthias* (Randall & Heemstra 2006). Our specimen agrees with these distinctions and belongs to the genus *Odontanthias*.

Odontanthias cauoh differs from all except two Indo-Pacific species by the presence of 15 soft rays in the dorsal fin: six have 14 or fewer, and six have 16 or more; and it differs from the other two in having 20 pectoral-fin rays, whereas those two have 17 or fewer. *Odontanthias cauoh* differs from the other Atlantic species, *O. hensleyi*, by the number of pectoral-fin rays (20 vs. 18), total gill rakers (39 vs. 42–43) presence of a posterior prolongation of the vomerine tooth patch (vs. posterior prolongation absent); pelvic fin not reaching base of last anal-fin ray (vs. extending beyond the anal-fin base), dorsal, anal and pelvic fins scaleless (vs. scaled); several body proportions (see Table 3), and coloration (dorsal, anal, and pelvic fins mostly dark red vs. mostly yellow). With the description of *O. cauoh*, the number of described species in the genus *Odontanthias* becomes 16, two of them in the Western Atlantic. The new species increases to six the number of endemic fishes found in the SPSPA.

Comparative material

Anthias anthias: BMNH 1860.5.3.27 (1, 124.1 mm SL), Lanzarote, Canary Islands, Spain). BMNH 1960.5.31.27-28 (2, 75.1–85.2 mm SL), Villefranche, France, Mediterranean, col. A. K. Totton.

Anthias menezesi: Holotype: MZUSP 11765 (1, 132.2 mm SL), N/O Prof. W. Besnard station 1655, 33°03'08"S, 51°00'04"W, off southern Brazil, 215 m, 19 May 1972. Paratypes: MZUSP 12609 (1, 156.8 mm SL) and MZUSP 12610 (1, 121.2 mm SL), both 01°32'S, 43°47'W, off northeastern Brazil, col. fishery vessel Toko-Maru, 7 April 1957; MZUSP 11766 (1, 165.3 mm SL) fish market at São Paulo, Brazil, col. R. P. Lambalot, May 1971; and MZUSP 11767 (1, 166.8 mm SL), same data as the previous one, June 1971. MZUSP 86434 (3, 104.4–138.8 mm SL), N/Pq Soloncy Moura, station 1135, 24°52'17"S, 44°36'02"W, Brazil, col. Projeto Revizee Score

Sul, 21 April 2002. MZUSP 86345 (1, 131.2 mm SL), N/Pq Soloncy Moura, station 427, 25°45'10"S, 45°12'13"W, Brazil, col. Projeto Revizee Score Sul, 16 Oct. 2001. MZUSP 86436 (1, 142.4 mm SL), N/Pq Soloncy Moura, station 1126, 25°44'55"S, 45°11'53"W, Brazil, col. Projeto Revizee Score Sul, 18 April 2002. MZUSP 86631 (1, 154.2 mm SL), N/Oc Atlantico Sul, station 850, 30°33'43"S, 48°35'43"W, Brazil, col. Projeto Revizee Score Sul, 9 April 2002. MZUSP 78152 (1, juvenile, 14.2 mm SL), N/Oc Atlantico Sul, station 351, 26°52'56"S, 46°53'32"W, Brazil, col. Equipe Revizee, 2 Dec. 1997. MZUSP 80753 (1, juvenile, 19.2 mm SL), N/Oc Atlantico Sul, station PE04, 26°27'19"S, 45°51'13"W, Brazil, col. Equipe Revizee, 15 Oct. 1999.

Anthias asperilinguis: Holotype: BMNH 1974.10.4.1 (1, 143 mm SL), South America, presented by Sir R. Schomburgk. USNM 185351 (2, 54–104 mm SL), Oregon station 2080, 2°4'0"N, 47°0'0"W, off northeastern Brazil (Pará), 400 km NE of Ilha Mexiana, 229 m, 17 Nov. 1957; UF 202348 (2, 54–145 mm SL), same data as the previous one.

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Internet museum collections resources

UF: http://www.flmnh.ufl.edu/scripts/dbs/fish_pub_proc.asp

USNM: <http://collections.mnh.si.edu/search/fishes/>